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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/981,500	10/16/2001	Patrick P. Naulleau	015780-042	6932

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EXAMINER
LAVARIAS, ARNEL C

ART UNIT	PAPER NUMBER
2872	

DATE MAILED: 10/24/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/981,500	NAULLEAU, PATRICK P.	
	Examiner	Art Unit	
	Arnel C. Lavarias	2872	

-- The MAILING DATE of this communication app ars on the cover sh et with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 October 2001 and 12 December 2001* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12 December 2001* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *4* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Drawings

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference sign(s) not mentioned in the description:

Figure 4- Reference numerals 40 and 45.

A proposed drawing correction, corrected drawings, or amendment to the specification to add the reference sign(s) in the description, are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

2. The disclosure is objected to because of the following informalities:

Page 2, line 22- 're-imagined' should read 're-imaged'

Page 2, line 29- '250,000 C' should read '250,000° C'

Page 3, line 9- 'Tichenor et al. U.S. Patent 6,031,598.' should read 'U.S. Patent 6,031,598 to Tichenor et al.'

Page 5, line 13- insert 'of' after 'use'

Page 10, line 6- insert 'now U.S. Patent 6,392,792, published May 21, 2002,' after '2002,'

Page 12, line 29-Page 13, line 1- 'Hudyma et al. U.S. Patents 6,226,346, 6,188,513, 6,072,852 and 6,033,079' should read 'U.S. Patents 6,226,346, 6,188,513, 6,072,852 and 6,033,079 to Hudyma et al.'.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-3 and 10-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki in view of Sweatt and Stanton et al.

Suzuki et al. discloses an illuminator device for an optical imaging processing system and a method of modifying the coherence of a beam of radiation from a source (See Figures 1 or 2), wherein the imaging processing system comprises an optical system requiring partially coherent illumination, and where the illuminator comprises a source of coherent or partially coherent radiation which has an intrinsic coherence that is higher than the desired coherence (See 1 in Figures 1 or 2; Paragraph 0112-0113); a holographic element having a surface that receives incident radiation from the source (See 7 in Figures 1 or 2); means for translating the surface of the holographic element in at least one dimension along a plane that is parallel to the surface of the holographic element wherein the rate of the motion is fast relative to integration time of the image processing

system (See 7a in Figures 1 or 2; Paragraph 0112-0113); and a condenser optic that re-images the surface of the holographic element to the entrance plane of the image processing system (See 8 or 12 in Figures 1 or 2). Suzuki additionally discloses the coherent or partially coherent radiation being diffracted by the surface of the holographic element to generate diffracted radiation containing diffracted orders of radiation and a zero order of radiation and the illuminator further comprising filtering means to block at least the zero order radiation from reaching the condenser optic (See 7, 7a, DS in Figure 1; 7, 7a, 18 in Figure 2; Paragraph 0092, 0099-0100). Also, Suzuki discloses the filtering means blocking all but the +1 or −1 order radiation from reaching the condenser optic (See 7, 7a, DS in Figure 1; 7, 7a, 18 in Figure 2; See Paragraph 0092, 0099-0100). Also, Suzuki discloses the means for moving the surface of the holographic element causing the surface to move only linearly in the plane of the holographic surface with the proviso that the surface is not rotated (See 7a in Figures 1 or 2; Paragraph 0112). Suzuki lacks the source being a synchrotron source and the holographic element being a holographic diffuser. However, Sweatt teaches a projection lithographic system (See Figure 4) wherein the source of light is a synchrotron (See col. 2, line 18-col. 3, line 4; col. 7, lines 51-63). Stanton et al. teaches a photolithographic illumination system (See Figure 1) wherein the diffractive elements (See 14 or 18 in Figure 1) can be holographic diffusers (See col. 4, lines 13-34). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate a synchrotron, as taught by Sweatt, and a holographic diffuser, as taught by Stanton et al., in the illuminator device for an optical imaging processing system and a method of modifying the

coherence of a beam of radiation from a source as disclosed by Suzuki. One would have been motivated to do use a synchrotron to utilize shorter wavelengths of light (in the order of 1-100 nm) thus increasing the wavelength resolution of the lithographic system. One would have been motivated to use a holographic diffuser to provide additional control over the source light wavefront, based on the characteristics of the diffuser.

5. Claims 8-9, and 19-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki in view of Sweatt and Stanton et al. as applied to Claims 1 and 11 above, and further in view of Makabe et al.

Suzuki in view of Sweatt and Stanton et al. disclose the invention as set forth above in Claims 1 and 11. Suzuki in view of Sweatt and Stanton et al. lack the condenser optic being a single, spherically reflective element. However, Makabe et al. teaches a soft x-ray lithographic system (See Figure 1) wherein the condenser optic (See 2 in Figure 1) is a single, spherically reflective element (See col. 3, lines 8-17). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the condenser optic be a single, spherically reflective element, such as a spherically concave reflector as taught by Makabe et al., in the illuminator device for an optical imaging processing system and a method of modifying the coherence of a beam of radiation from a source as disclosed by Suzuki in view of Sweatt and Stanton et al. One would have been motivated to do this to reduce the number of optical elements in the system, thus increasing the overall efficiency and light throughput (this factor being particularly important since source wavelengths of 1-100 nm are being considered and most optical materials are highly absorbing at these wavelengths).

6. Claims 4-5, and 15-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki in view of Sweatt and Stanton et al. as applied to Claims 1 and 11 above, and further in view of Kathman et al.

Suzuki in view of Sweatt and Stanton et al. disclose the invention as set forth above in Claims 1 and 11. Stanton et al. additionally disclose that the diffusive optical element may have amplitude and/or phase modulation or patterns which generate distinct amplitude, phase, and intensity patterns (See col. 4, lines 13-34). Suzuki in view of Sweatt and Stanton et al. lack the holographic diffuser being a binary phase or amplitude device. However, Kathman et al. teaches diffractive optical diffusers having binary phase and/or amplitudes (See for example Figures 1 or 2; col. 1, lines 23-62). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the holographic diffuser be a binary phase or amplitude device, as taught by Kathman et al., in the illuminator device for an optical imaging processing system and a method of modifying the coherence of a beam of radiation from a source as disclosed by Suzuki in view of Sweatt and Stanton et al. One would have been motivated to do this to reduce or eliminate the zero order diffraction for the designed source wavelength (i.e. the synchrotron emission wavelength).

7. Claims 6-7, and 17-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki in view of Sweatt and Stanton et al. as applied to Claims 1 and 11 above, and further in view of Hamano et al.

Suzuki in view of Sweatt and Stanton et al. disclose the invention as set forth above in Claims 1 and 11. Suzuki in view of Sweatt and Stanton et al. lack the holographic

diffuser being a blazed phase device quantized to between 3 and 8 levels. However, Hamano et al. teaches a holographic diffuser that is blazed and quantized between 3 and 8 levels (See for example Figures 17, 18, 23a, 23b, 24a-e; Paragraphs 0176-0184, 0223-0235). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the holographic diffuser be a blazed phase device quantized to between 3 and 8 levels, as taught by Hamano et al., in the illuminator device for an optical imaging processing system and a method of modifying the coherence of a beam of radiation from a source as disclosed by Suzuki in view of Sweatt and Stanton et al. One would have been motivated to do this to adjust the wavelength of maximum diffraction efficiency, as well as maximize the diffraction efficiency of the diffuser.

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Arnel C. Lavarias whose telephone number is 703-305-4007. The examiner can normally be reached on M-F 8:30 AM - 5 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cassandra Spyrou can be reached on 703-308-1687. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-1782.

Arnel C. Lavarias
October 18, 2002

Cassandra Spyrou
Supervisory Patent Examiner
Technology Center 2800